The H1N1 Pandemic – How Ontario Fared

A Report by Ontario's Chief Medical Officer of Health

June 2010

Ministry of Health and Long-Term Care

Chief Medical Officer of Health

Public Health Division
11th Floor, Hepburn Block
Queen's Park
Toronto ON M7A 1R3

Telephone: (416) 212-3831
Facsimile: (416) 325-8412

Ministère de la Santé et des Soins de longue durée

Médecin hygiéniste en chef

Division de la santé publique
Édifice Hepburn, 11e étage
Queen's Park
Toronto ON M7A 1R3

Téléphone: (416) 212-3831
Télécopieur: (416) 325-8412

Ontario

From a public health point of view, there was really only one major story in 2009, and that was H1N1. There were times that it seemed there was no other story at all in Ontario or anywhere else for that matter. It was a year ago in April that we first began hearing about a new strain of influenza from health authorities in the United States and Mexico. A month later, the world was on high alert – cases were being reported in other countries, including Canada. On June 11, the World Health Organization declared a global pandemic. It was exactly four days later that I took up the position of Chief Medical Officer of Health for Ontario, so to say that I hit the ground running would be something of an understatement.

In September of last year, as Ontario was heading into its traditional flu season, I released a report to the people of Ontario. Its purpose was twofold: to inform Ontarians about H1N1 and remind them of the precautions they should be taking, and to reassure them that as a province we were ready. It was going to be a different flu season, I told them, but we would get through it together. And we did.

In a technical sense, the pandemic has not yet run its course. We are waiting to see if there will be another upsurge, but we have good reason to believe that the worst is over. I am releasing this second report to Ontarians to give them my impressions of how things went during the first pandemic we have faced as a province in more than 40 years.

I also want to acknowledge that we did not get through H1N1 unscathed. Tragically, despite our best efforts, 128 people succumbed to H1N1. To the families who lost loved ones, our thoughts and sympathies are with you as we examine how we can improve our response to the next pandemic.

I need to emphasize that this report is by no means the final word on H1N1. It is safe to say that jurisdictions the world over are preparing reports on how well they handled the pandemic, and Ontario is no exception. The Ministry of Health and Long-Term Care is currently conducting a detailed review of its response to H1N1. This review is a process review as opposed to an impact assessment. The actual impact of our pandemic response, in terms of deaths prevented and hospitalizations averted, is the subject of many other studies currently ongoing or planned.

This much less formal report is something that I owe, in my capacity as CMOH, to the people of this province. Last September I told them that we were ready. I believe that history will record that we were. But if we are going to be even more ready for the next pandemic, we need to be completely honest about what went right, and what went wrong, in our response to this one. This is my initial attempt at doing exactly that. I am proud of how this province came together to deal with H1N1. I am proud of our public health system. I am proud of our hospitals, our clinics, our doctors and our nurses. I am proud to have worked with a provincial government that, in the best possible way, stepped aside and let us do our work. And I am proud of the people of Ontario for staying calm, being patient when things didn't go as smoothly as they should, and for getting us through the H1N1 pandemic together.

A. King.

Dr. Arlene King
Ontario Chief Medical Officer of Health

"We want to know what worked well. We want to know what went wrong and, ideally, why. We want to know what can be done better and, ideally, how."
Dr. Margaret Chan – Director General, World Health Organization[1]

As of the writing of this report, more than 213 countries have confirmed cases of the H1N1 flu, and there have been more than 18,000 deaths. Currently, the most active areas of transmission are in parts of West and Central Africa, but transmission is also still occurring in South East Asia and Central America. H1N1 flu activity remains low in much of the temperate zone of the northern hemisphere. In Australia and New Zealand, as we approach the start of southern hemisphere winter flu season, there is no evidence yet of community transmission of influenza viruses; however in Chile there has been evidence of early localized H1N1 flu virus activity.[2]

In Ontario and Canada, all indications are that the worst has passed.[3] While it is too early to declare the pandemic over, it is not too early to begin looking at how we responded in this province, and how we might better respond the next time there is a need.

The obvious first step is to study the story told by the numbers – what was the impact of H1N1 here, and how does it compare to the impact it had in other jurisdictions?

The answers to those questions would seem to bear out the predominant impression that Ontario was as ready as anyone for the arrival of H1N1. From the start of the pandemic until January 30, 2010, 128 people in Ontario who had H1N1 are reported to have died.[4,5] That works out to 0.98 deaths per 100,000 people. The death rate for Canada as a whole for the same time period was 1.26 per 100,000 people.[6]

The table below lists several key indicators by which we can assess the impact of H1N1 in several different jurisdictions, including Ontario. It is very clear that we compare at worst satisfactorily and at best very favourably to most of them.

Table 1.

Number and rate of pH1N1 deaths, hospitalizations and ICU admissions in Ontario compared to other jurisdictions within and outside of Canada (April 1, 2009 to January 30, 2010)

Jurisdiction	Reported Deaths		Reported Hospitalizations		ICU Admissions	
	n	Rate	n	Rate	N	Rate
CANADA	426	1.26	8,596	25.48	1,446	4.29
CANADA (excluding ON)	298	1.44	6,753	32.67	1,133	5.48
Alberta	71	1.93	1,276	34.6	239	6.48
British Columbia	56	1.26	1,059	23.77	155	3.48
Manitoba	11	0.90	379	31.01	61	4.99
New Brunswick	8	1.07	164	21.88	34	4.54
Newfoundland/Labrador	18	3.54	277	54.43	52	10.22
Northwest Territories	1	2.3	52	119.82	7	16.13
Nova Scotia	7	0.75	289	30.8	50	5.33
Nunavut	1	3.11	80	248.45	6	18.63
Ontario	**128**	**0.98**	**1,843**	**14.1**	**313**	**2.39**
Prince Edward Island	0	0	50	35.46	9	6.38
Quebec	108	1.38	3,062	39.11	465	5.94
Saskatchewan	15	1.46	67	6.5	52	5.05
Yukon	3	8.90	15	44.51	3	8.9
AUSTRALIA	191	0.87	4,992	22.82	N/A	N/A
FRANCE	285	0.44	N/A	N/A	N/A	N/A
MEXICO	995	0.94	N/A	N/A	N/A	N/A
UNITED KINGDOM	411	0.67	N/A	N/A	N/A	N/A
UNITED STATES*		0.81		15.84		N/A

Source (Ontario counts):	Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted at 8:30 am [04/03/2010].
Source (Ontario population):	Provincial Health Planning Database
Source (Canadian and P/T):	FluWatch, current to January 30, 2010
Source (international counts):	Respective national departments of health; current to Feb 5, 2010 for Australia, Jan 30 for United States, Jan 29 for Mexico
Source (international population):	Canada and its provinces/territories, Australia and United States (2009), Mexico (2010)

Note: Other countries, reported deaths were those due to H1N1, whereas in Canada (including Ontario) all deaths in H1N1 cases were counted, some of which might have occurred for reasons other than H1N1. Therefore Ontario death data is best compared to the death data for the rest of Canada.

*The US have estimated that between April 2009 and March 19, 2010, approximately 270,000 hospitalizations and 12,270 deaths occurred in H1N1 cases in the United States.[7]

The story of H1N1 in Ontario is told here in several short chapters, each dealing with a different aspect of this province's response to the H1N1 pandemic. What will then follow, and what may conceivably be of most interest to Ontarians, is my assessment of what went right and, more particularly, what went wrong. Like the World Health Organization, Ontario is determined to identify ways in which our pandemic preparation and response can be improved.

We live in a truly interconnected world, and with that interconnectedness comes vulnerability to literally any disease that emerges anywhere in the world. Because of air travel, a disease can take less than a day to travel around the globe under the right, or wrong, circumstances. A recent study, for example, found Toronto to be one of the most vulnerable cities in the world in that regard because of our high volume of air travel to and from a great number of different locations.[8]

Simply put, we know beyond a shadow of doubt that at some point, there will either be another pandemic, or another emerging infectious disease event like SARS, that will require a provincial response. We intend that response to be as robust and effective as it can be.

H1N1 Evolution Timeline

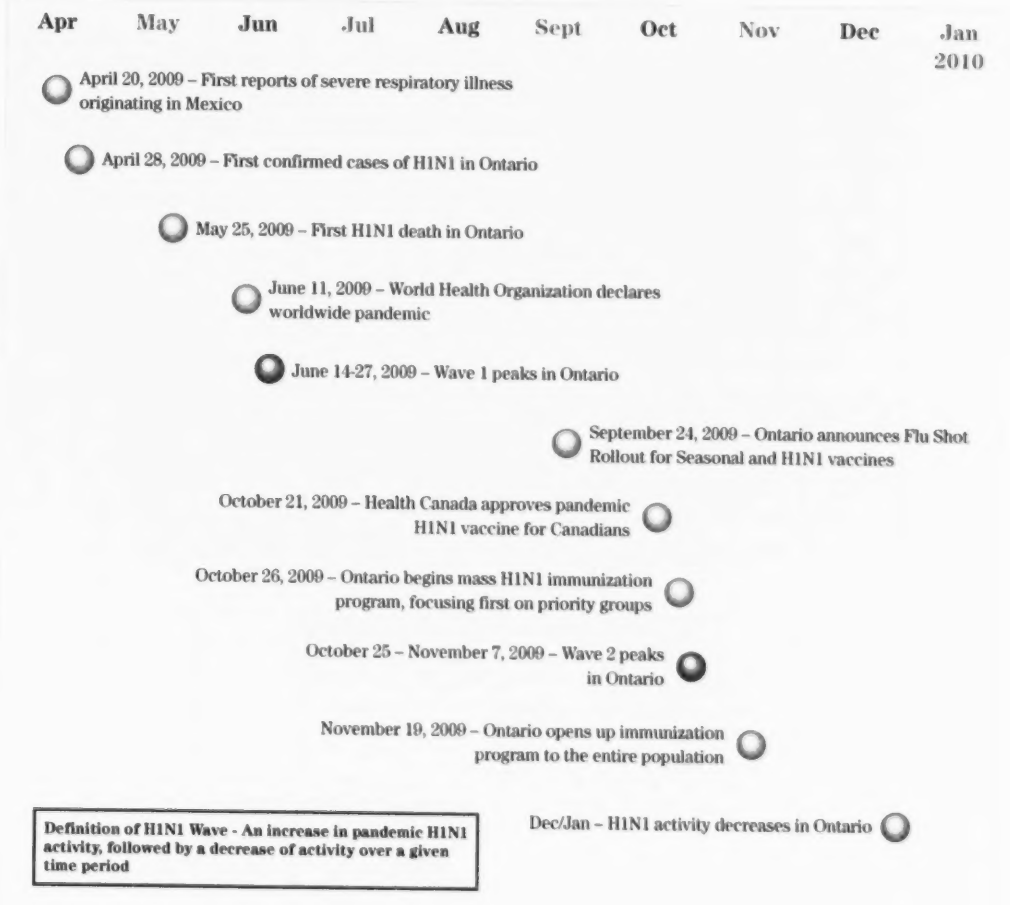

Apr
May
Jun
Jul
Aug
Sept
Oct
Nov
Dec
Jan 2010
April 20, 2009 – First reports of severe respiratory illness originating in Mexico
April 28, 2009 – First confirmed cases of H1N1 in Ontario
May 25, 2009 – First H1N1 death in Ontario
June 11, 2009 – World Health Organization declares worldwide pandemic
June 14-27, 2009 – Wave 1 peaks in Ontario
September 24, 2009 – Ontario announces Flu Shot Rollout for Seasonal and H1N1 vaccines
October 21, 2009 – Health Canada approves pandemic H1N1 vaccine for Canadians
October 26, 2009 – Ontario begins mass H1N1 immunization program, focusing first on priority groups
October 25 – November 7, 2009 – Wave 2 peaks in Ontario
November 19, 2009 – Ontario opens up immunization program to the entire population
Dec/Jan – H1N1 activity decreases in Ontario
Definition of H1N1 Wave - An increase in pandemic H1N1 activity, followed by a decrease of activity over a given time period

Table 1.

Number and rate of pH1N1 deaths, hospitalizations and ICU admissions in Ontario compared to other jurisdictions within and outside of Canada (April 1, 2009 to January 30, 2010)

Jurisdiction	Reported Deaths		Hospitalizations		ICU Admissions	
	n	Rate	n	Rate	N	Rate
CANADA	426	1.26	8,596	25.48	1,446	4.29
CANADA (excluding ON)	298	1.44	6,753	32.67	1,133	5.48
Alberta	71	1.93	1,276	34.6	239	6.48
British Columbia	56	1.26	1,059	23.77	155	3.48
Manitoba	11	0.90	379	31.01	61	4.99
New Brunswick	8	1.07	164	21.88	34	4.54
Newfoundland/Labrador	18	3.54	277	54.43	52	10.22
Northwest Territories	1	2.3	52	119.82	7	16.13
Nova Scotia	7	0.75	289	30.8	50	5.33
Nunavut	1	3.11	80	248.45	6	18.63
Ontario	**128**	**0.98**	**1,843**	**14 1**	**313**	**2.39**
Prince Edward Island	0	0	50	35.46	9	6.38
Quebec	108	1.38	3,062	39.11	465	5.94
Saskatchewan	15	1.46	67	6.5	52	5.05
Yukon	3	8.90	15	44.51	3	8.9
AUSTRALIA	191	0.87	4,992	22.82	N/A	N/A
FRANCE	28	0.44	N/A	N/A	N/A	N/A
MEXICO		0.94		N/A		N/A
UNITED KINGDOM		0.67		N/A		N/A
UNITED STATES*		0.81		15.84		N/A

Source (Ontario counts):	Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted at 8:30 am [04/03/2010].
Source (Ontario population):	Provincial Health Planning Database
Source (Canadian and P/T):	FluWatch, current to January 30, 2010
Source (international counts):	Respective national departments of health; current to Feb 5, 2010 for Australia, Jan 30 for United States, Jan 29 for Mexico
Source (international population):	Canada and its provinces/territories, Australia and United States (2009), Mexico (2010)

Note: Other countries, reported deaths were those due to H1N1, whereas in Canada (including Ontario) all deaths in H1N1 cases were counted, some of which might have occurred for reasons other than H1N1. Therefore Ontario death data is best compared to the death data for the rest of Canada.

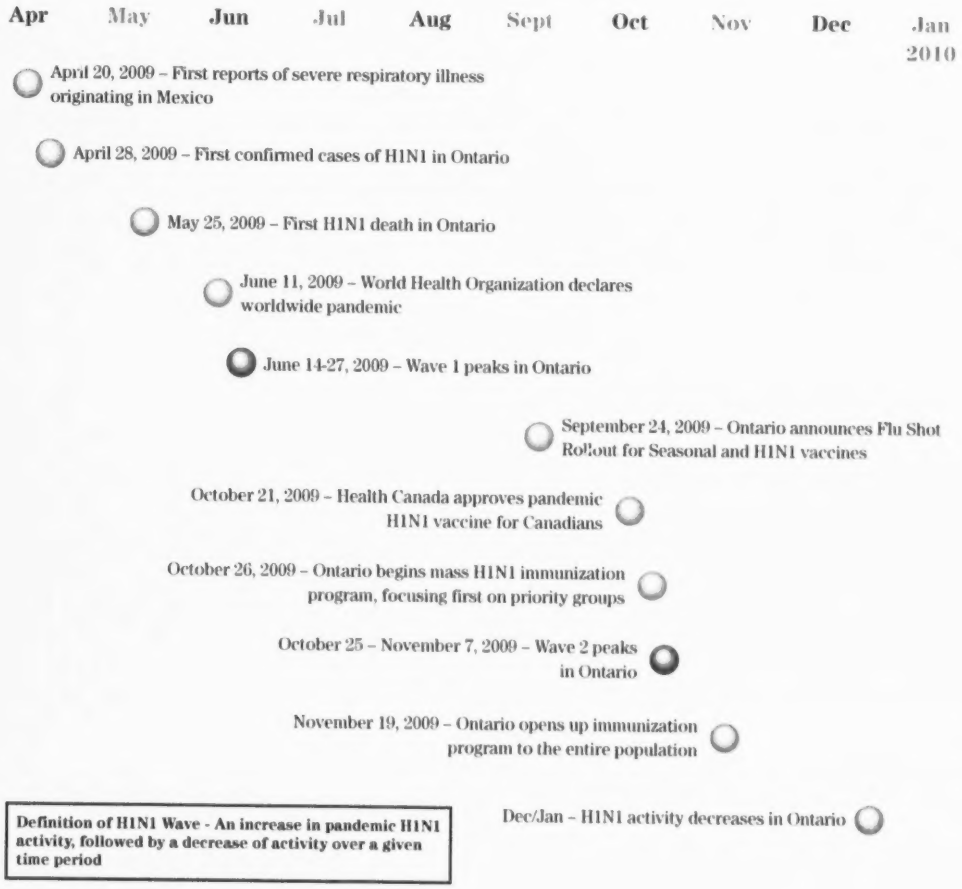
*The US have estimated that between April 2009 and March 19, 2010, approximately 270,000 hospitalizations and 12,270 deaths occurred in H1N1 cases in the United States.[7]

The story of H1N1 in Ontario is told here in several short chapters, each dealing with a different aspect of this province's response to the H1N1 pandemic. What will then follow, and what may conceivably be of most interest to Ontarians, is my assessment of what went right and, more particularly, what went wrong. Like the World Health Organization, Ontario is determined to identify ways in which our pandemic preparation and response can be improved.

We live in a truly interconnected world, and with that interconnectedness comes vulnerability to literally any disease that emerges anywhere in the world. Because of air travel, a disease can take less than a day to travel around the globe under the right, or wrong, circumstances. A recent study, for example, found Toronto to be one of the most vulnerable cities in the world in that regard because of our high volume of air travel to and from a great number of different locations.[8]

Simply put, we know beyond a shadow of doubt that at some point, there will either be another pandemic, or another emerging infectious disease event like SARS, that will require a provincial response. We intend that response to be as robust and effective as it can be.

H1N1 Evolution Timeline


Apr
May
Jun
Jul
Aug
Sept
Oct
Nov
Dec
Jan 2010
April 20, 2009 – First reports of severe respiratory illness originating in Mexico
April 28, 2009 – First confirmed cases of H1N1 in Ontario
May 25, 2009 – First H1N1 death in Ontario
June 11, 2009 – World Health Organization declares worldwide pandemic
June 14-27, 2009 – Wave 1 peaks in Ontario
September 24, 2009 – Ontario announces Flu Shot Rollout for Seasonal and H1N1 vaccines
October 21, 2009 – Health Canada approves pandemic H1N1 vaccine for Canadians
October 26, 2009 – Ontario begins mass H1N1 immunization program, focusing first on priority groups
October 25 – November 7, 2009 – Wave 2 peaks in Ontario
November 19, 2009 – Ontario opens up immunization program to the entire population
Dec/Jan – H1N1 activity decreases in Ontario
Definition of H1N1 Wave - An increase in pandemic H1N1 activity, followed by a decrease of activity over a given time period

Ontario Health Plan for an Influenza Pandemic

In 2003, the SARS epidemic rocked Ontario. The disease, which originated in Central China, killed 44 people in this province and made some 330 very ill. It also seriously affected tourism, which badly damaged the provincial economy. Finally, it exposed clear weaknesses in our public health and emergency response systems. That was a bitter lesson, but was arguably the one good thing about an otherwise tragic event. As a society, and as a province, we were determined not to be caught unprepared again.

The next year, the Ministry of Health and Long-Term Care released the Ontario Health Plan for an Influenza Pandemic (OHPIP).[9] This plan is what is known as an evergreen, or living, document because it is constantly being updated and improved to reflect new knowledge and information and promote current best practices.

The OHPIP was created for situations like H1N1, so even before the World Health Organization declared a global pandemic, the plan was being implemented in Ontario.

Epidemic vs. Pandemic

Epidemic is the classification given to a disease that appears as new cases in a given human population, during a given period, at a rate that substantially exceeds what is "expected," based on recent experience.

Pandemic is the classification given to an epidemic that spreads across a large region – a country, continent or even worldwide.

Surveillance

Heightened surveillance is critical during a pandemic, and never more so than at the beginning. In this province, the Ministry of Health and Long-Term Care and the Ontario Agency for Health Protection and Promotion (OAHPP) developed a joint surveillance strategy. Its objectives, all of which were realized, were to assess the disease severity and identify at-risk populations, monitor the epidemiology (causes and distribution patterns) of the disease, determine the safety and effectiveness of various interventions and contribute to the national and international picture of virus activity.

Surveillance was carried out on a number of fronts, including tracking calls to TeleHealth Ontario, assessing severity of the disease by monitoring hospitalizations and deaths, keeping a close watch on the international situation and studying the rate of school absenteeism. In late April 2009, Ontario began testing patients who were presenting signs of respiratory illness for the H1N1 flu virus. The information that was collected from those cases during that first wave made us better prepared to deal with the second wave of H1N1.

One of our key surveillance functions was to assess the severity of the disease in Ontario by monitoring hospitalizations and deaths. The number of hospitalizations during the second wave was higher than in the first wave because the disease was more widespread.[10] However, as indicated in Table 1, the rates of hospitalization and death in Ontario were lower than the national rates over the course of the pandemic[5,11] and lower than the estimated US rates.[7]

Although the death rate was lower, the burden of hospitalization and death was largely seen in younger populations which is different from seasonal flu. Many of the hospitalizations and deaths were in people with underlying health conditions.

Data and knowledge gained through extensive and heightened surveillance were shared with health care providers, public health professionals, government officials and the public at large.

Response Coordination

The response to H1N1 in Ontario was a testament to what can be accomplished when people, organizations and different levels of government make working together a top priority.

Federal/Provincial/Territorial

Canada began responding as a nation in the very early stages of the pandemic. Federal, Provincial and Territorial Deputy Ministers as well as senior public health officials from across the country began meeting regularly, sometimes as often as daily, beginning in April 2009. All 13 provinces and territories as well as Health Canada and the Public Health Agency of Canada were represented. Those meetings became less frequent as the pandemic ran its course and it was clear that the plans that had been put in place were working.

Ministry Emergency Operations Centre

In Ontario, the central response to the pandemic was coordinated through the Ministry of Health and Long-Term Care's Emergency Management Branch. This branch was established to coordinate the ministry's response in a health emergency such as a pandemic. The branch operates the Ministry Emergency Operations Centre (MEOC) which was activated on April 27, 2009. MEOC was to be the central hub for the gathering, processing and dissemination of information necessary for the management of the situation, coordinating all ministry response activities.

MEOC was the intake point for questions from health stakeholders. Regular teleconferences with health stakeholders and the Health Providers Hotline were the mechanisms by which the ministry was able to keep stakeholders informed and up to date. By the end of January, the hotline had received 4,439 H1N1-related calls. In addition to managing information, MEOC was responsible for creating and distributing information documents, leading the distribution of antivirals and the vaccine, deploying supplies and equipment, and implementing strategies for alternate assessment, treatment and referral.

Provincial Emergency Operations Centre

The Provincial Emergency Operations Centre (PEOC) was activated on April 29, two days after MEOC, and functioned in a support capacity, coordinating other related government activities. Advance pandemic planning and exercises with key ministry partners such as Emergency Management Ontario, Ministry of Government Services and Ministry of Labour were integral to the provincial response.

Ontario Agency for Health Protection and Promotion

The emergence of H1N1 nearly coincided with the first year anniversary of the Ontario Agency for Health Protection and Promotion (OAHPP). Following the SARS outbreak in 2003, several high profile reports[12,13,14] recommended the creation of a public health agency for Ontario. OAHPP was created to provide scientific and technical advice to government and the health care system.

During the pandemic, OAHPP coordinated the Scientific Response Team of agency and field experts who informed the ministry response to H1N1. They worked collaboratively with other health agencies across the country and with international leaders in the field of public health to advise on the response, and were actively involved in the strategic committees overseeing the response. The speed with which the OAHPP ramped up and the effectiveness of the agency's response were critical in supporting the overall provincial response.

Communications

Ontario's response to the H1N1 pandemic was characterized by regular and comprehensive communication with the people of Ontario, as well as with health care stakeholders and with Ottawa and the other provinces.

The Ministry of Health and Long-Term Care assumed the role of lead communicator for the provincial government. The communications effort took the form of regular news conferences to update the public, media availability by spokespeople when requested, as well as advertising in different forms to inform the public about safety precautions, flu clinics, vaccines and other important information.

Health System Response

One of the biggest concerns of any jurisdiction dealing with a pandemic is the ability of the health system to manage increased demands. When people are sick, or even worried they might be sick, they instinctively turn to their local hospital emergency department or to their family doctor. If too many people do that at once, that can overload hospitals or doctors' offices, reducing their ability not only to help people with the flu, but to help other patients and deal with the many other demands that are made of them every day. Particularly in the case of hospitals, if that happens to a significant number at once, the effect on the overall system could be devastating.

That did not happen in Ontario. The province's Critical Care Secretariat worked with 124 hospitals across the province to implement a coordinated surge capacity management plan, which helped to manage increased demand in critical care units. Our hospitals reported significant spikes in emergency room activity during the first and particularly the second wave, and doctors' offices were certainly busy, but in all cases they were able to cope. This is due to a high level of preparedness on their part, and also because health service providers in communities across the province put in place alternate means of providing influenza assessment, treatment and referral services.

The most common of these were flu assessment centres, 60 of which were opened across the province. These centres were able to assess and treat Ontarians suffering from the H1N1 flu, working in partnership with other health care providers in the community and taking pressure off hospitals and doctors' offices in the process.

The difference between an antiviral and a vaccine

Antivirals are drugs used for the early treatment of influenza. They do not provide immunity to the virus, but if taken soon enough after exposure, they can reduce symptoms, shorten the length of illness and reduce the risk of complications.

Vaccines produce immunity to specific diseases by stimulating the production of antibodies. They are the primary means of preventing the spread of influenza.

Antivirals

As part of its Health Plan for an Influenza Pandemic, Ontario made it a priority to have a stockpile of antivirals on hand for treatment purposes in the event of an influenza pandemic. There is a national strategy under which provinces work with Ottawa to purchase enough antivirals to treat 17.5 percent of all Canadians.[15] This is considered enough to meet the demand during a pandemic. In accordance with our provincial plan, Ontario exceeded that target, purchasing enough to treat 25 percent of all Ontarians.[9] When the H1N1 pandemic struck, we knew we had enough antivirals stockpiled to treat everyone who needed them.

By the end of wave 2, more than 850,000 treatment courses of Tamiflu had been deployed from the provincial stockpile to more than 3,000 community pharmacies and 140 other locations in the province. Of these, 125,000 treatment courses were used to treat Ontarians with the flu.

Vaccine

The first and best line of defense against any influenza is prevention and, as the world realized it was facing a pandemic of H1N1, an international effort was launched to develop a vaccine as quickly as possible.

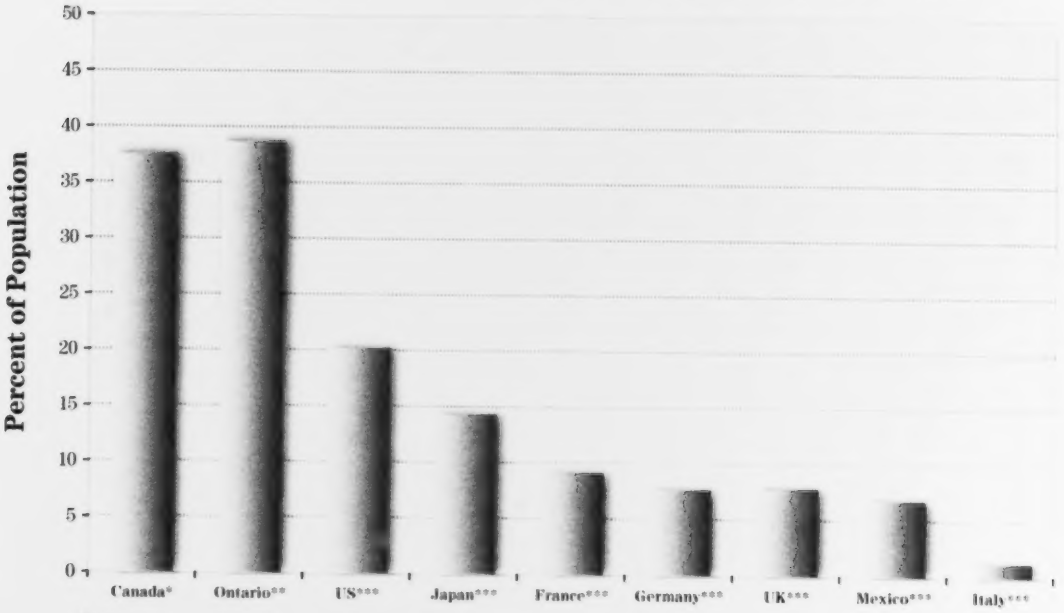
In Canada, responsibility for contracting with the maker of the vaccine, GlaxoSmithKline (GSK), rested with the federal government. The vaccine was ordered by Ottawa, following consultation with the provinces and territories as to how much was required. As the vaccine was produced, it had to be approved by Health Canada.[16] Then, and only then, was it shipped to the provinces and territories. Ontario received its first shipments of the vaccine by October 20th. It was sent out across the province starting on the 21st, and immunization began across the country on October 26th.

The national strategy for administration of the vaccine involved establishing priority groups. It was agreed amongst all the Federal, Provincial and Territorial partners that the following groups would be given first access to the vaccine:

- Pregnant women;
- Children between the ages of six months to five years;
- People living in remote and isolated communities;
- People under 65 with chronic conditions;
- Health care workers, and
- Household contacts and care providers of infants less than 6 months of age and people who are immunocompromised.[17]

On November 16th, Ontario's immunization program was extended to include children aged 5 to 13, and the vaccine became available for any Ontarian who wanted it on November 19th. In total, Ontario ordered approximately 13 million doses of the H1N1 vaccine. It is estimated that as many as five million Ontarians have been immunized.

Comparison of Immunization Coverage Rates for pH1N1 Vaccine



Source:
Global Health Security Initiative, Pandemic Influenza Working Group. H1N1 case estimates. H1N1 Meetings; December 2009-March 2010. (Unpublished data).
Public Health Agency of Canada; 2010. (Unpublished data)
Data Notes:
*Public Health Agency of Canada – data for Canada is based on H1N1 vaccine coverage data submitted by the provinces and territories for the general population and is based on the number of individuals immunized in each jurisdiction, as of Feb 28, 2010
**Ministry of Health and Long-Term Care, Communications and Information Branch – polling occurred from October 2009 to January 2010
***Country data received from Public Health Agency of Canada – for Germany, Italy, Japan, US and Mexico are as of March 2010; data for UK and France are as of January 2010

National coverage data: Sources and caveats
National H1N1 vaccine coverage data is obtained from data submitted by the provinces and territories and is based on the actual number of individuals immunized in each jurisdiction.
As of February 28, 2010, the percent H1N1 vaccine coverage in the general population was 37.4%. However, this value increased to 52.5% when provinces and territories with incomplete H1N1 vaccine coverage (including Ontario) were excluded from the analysis.
The above H1N1 vaccine coverage data are subject to some data limitations such as lag time in data uploading and delays in reporting from the provinces and territories, all of which contribute to lower the reported H1N1 vaccine coverage data.

Provincial coverage data: Methodology used by Communications and Information Branch
A total of 500-800 people were polled per week from beginning of October 2009 to middle of January 2010.
Respondents were drawn randomly from an online panel of Ontarians managed by Ipsos Reid.
A range of questions were asked from actual/intended uptake of the shot, to attitudes about H1N1 and the vaccine.
The sample ensures a representative sample of Ontarians - so proportion of respondents from the GTA would be representative of the proportion of Ontarians who reside in the GTA.
The age distribution was 18-65 years of age, with specific age brackets within that range again proportionate to the population of the province - so proportion of respondents 18-24 years of age would be representative of the the proportion of Ontarians in this age bracket.
Parents were asked questions about the actual/intended vaccination status of their dependent children living at home, as well as the reasons why the child(ren) were/were not immunized.
Polls were conducted nightly from beginning of October 2009 to middle of January 2010, with a brief hiatus over the Christmas period. Two more polls were conducted between Jan 15-19 and Jan 26- Feb 1 to update tracking of immunization and to measure awareness of ad campaigns.

Vaccine

The first and best line of defense against any influenza is prevention and, as the world realized it was facing a pandemic of H1N1, an international effort was launched to develop a vaccine as quickly as possible.

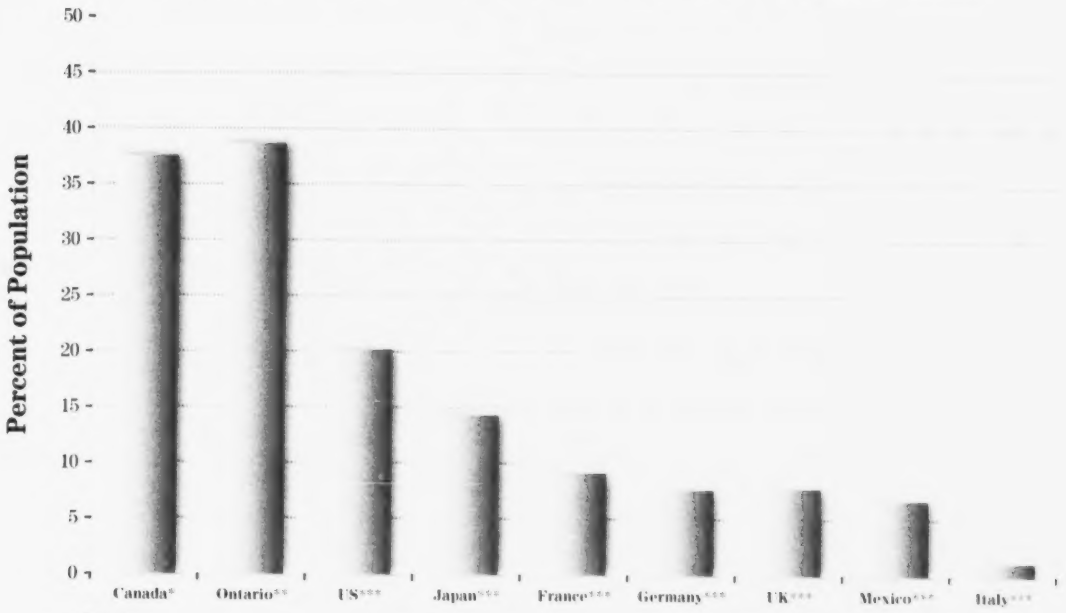
In Canada, responsibility for contracting with the maker of the vaccine, GlaxoSmithKline (GSK), rested with the federal government. The vaccine was ordered by Ottawa, following consultation with the provinces and territories as to how much was required. As the vaccine was produced, it had to be approved by Health Canada.[16] Then, and only then, was it shipped to the provinces and territories. Ontario received its first shipments of the vaccine by October 20th. It was sent out across the province starting on the 21st, and immunization began across the country on October 26th.

The national strategy for administration of the vaccine involved establishing priority groups. It was agreed amongst all the Federal, Provincial and Territorial partners that the following groups would be given first access to the vaccine:

- Pregnant women;
- Children between the ages of six months to five years;
- People living in remote and isolated communities;
- People under 65 with chronic conditions;
- Health care workers, and
- Household contacts and care providers of infants less than 6 months of age and people who are immunocompromised.[17]

On November 16th, Ontario's immunization program was extended to include children aged 5 to 13, and the vaccine became available for any Ontarian who wanted it on November 19th. In total, Ontario ordered approximately 13 million doses of the H1N1 vaccine. It is estimated that as many as five million Ontarians have been immunized.

Comparison of Immunization Coverage Rates for pH1N1 Vaccine



Source:
Global Health Security Initiative, Pandemic Influenza Working Group. H1N1 case estimates. H1N1 Meetings; December 2009-March 2010. (Unpublished data).
Public Health Agency of Canada; 2010. (Unpublished data)
Data Notes:
*Public Health Agency of Canada – data for Canada is based on H1N1 vaccine coverage data submitted by the provinces and territories for the general population and is based on the number of individuals immunized in each jurisdiction, as of Feb 28, 2010
**Ministry of Health and Long-Term Care, Communications and Information Branch – polling occurred from October 2009 to January 2010
***Country data received from Public Health Agency of Canada – for Germany, Italy, Japan, US and Mexico are as of March 2010; data for UK and France are as of January 2010

National coverage data: Sources and caveats
National H1N1 vaccine coverage data is obtained from data submitted by the provinces and territories and is based on the actual number of individuals immunized in each jurisdiction.
As of February 28, 2010, the percent H1N1 vaccine coverage in the general population was 37.4%. However, this value increased to 52.5% when provinces and territories with incomplete H1N1 vaccine coverage (including Ontario) were excluded from the analysis.
The above H1N1 vaccine coverage data are subject to some data limitations such as lag time in data uploading and delays in reporting from the provinces and territories, all of which contribute to lower the reported H1N1 vaccine coverage data.

Provincial coverage data: Methodology used by Communications and Information Branch
A total of 500-800 people were polled per week from beginning of October 2009 to middle of January 2010.
Respondents were drawn randomly from an online panel of Ontarians managed by Ipsos Reid.
A range of questions were asked from actual/intended uptake of the shot, to attitudes about H1N1 and the vaccine.
The sample ensures a representative sample of Ontarians - so proportion of respondents from the GTA would be representative of the proportion of Ontarians who reside in the GTA.
The age distribution was 18-65 years of age, with specific age brackets within that range again proportionate to the population of the province - so proportion of respondents 18-24 years of age would be representative of the the proportion of Ontarians in this age bracket.
Parents were asked questions about the actual/intended vaccination status of their dependent children living at home, as well as the reasons why the child(ren) were/were not immunized.
Polls were conducted nightly from beginning of October 2009 to middle of January 2010, with a brief hiatus over the Christmas period. Two more polls were conducted between Jan 15-19 and Jan 26- Feb 1 to update tracking of immunization and to measure awareness of ad campaigns.

Current Review

As mentioned at the beginning of this report, the Ministry of Health and Long-Term Care is currently conducting a detailed review of its response to the pandemic. When this is released, the findings of the review will paint a much clearer picture of Ontario's H1N1 response than anyone has seen to date. I would urge those interested in a complete and technically detailed examination of what happened in this province during the pandemic to read it.

Because I felt that I had a duty as Chief Medical Officer of Health for the province of Ontario to share my impressions with the people of this province as soon as I could, this report is being released ahead of the other review findings. These impressions bear on the aspects of the response people could see and experience, and leave the more operational aspects to the other review. I must emphasize, however, that my impressions have been informed in some measure by the research that supports those other reviews.

If asked to assess Ontario's response to H1N1, most people indicate a general level of satisfaction with how events were handled. If asked to point to areas where they think things could have been handled better, they almost invariably express concern about the lineups for immunization. As Chief Medical Officer of Health my perspective on things is somewhat unique, having been the person in charge of leading the provincial response. That being said, my answers to those questions would reflect the same general satisfaction, as well as many of the same concerns.

What Went Right

We got through it. In any examination of a pandemic response, that has to be the starting point. As noted in the Introduction, our preliminary assessment of rates of death and hospitalization shows we were low relative to overall Canadian rates. In addition, as shown in the previous chart, our immunization coverage is higher than that of most countries in the world. Every person who wanted a vaccine received one. To repeat, we got through it. That is, in part, because a characteristic of the H1N1 flu has turned out to be its utter dominance of the seasonal flu strain. Ontario experienced almost no seasonal flu during the pandemic, and our H1N1 death rate was lower than what we usually see for seasonal flu. Approximately 300 deaths are reported to the ministry each year related to seasonal flu compared to 128 for H1N1.*

Collaboration

From my point of view, the worldwide response to H1N1 was characterized by unprecedented collaboration. It started with the World Health Organization and filtered down. Here in Canada, the Federal-Provincial-Territorial response, while not without the kind of challenges you would expect in any undertaking this complex and important, was always driven by an absolute commitment to getting it right on behalf of Canadians.

* There are limitations in comparing the deaths between seasonal and pandemic influenza cases. For example, seasonal influenza cases are not always followed up to determine if the outcome, and therefore deaths, are underreported.

Here in Ontario, I saw provincial and municipal governments, public health units and a myriad other health care stakeholders working together towards a common goal, which was providing Ontarians with the best possible response to a new and potentially deadly virus.

First Nations Communities

Pandemic response is about speed, coordination, integration and communication. It is about getting people the information and vaccines they need to stay healthy, and the medication and care they need if they fall ill. For obvious reasons, doing these things in remote and northern communities is extremely challenging. The way the system and our partners rose to those challenges in Ontario's north during the pandemic of 2009 is something of which I am particularly proud.

Many of these communities are First Nations, and along with Health Canada we worked with the Chiefs of Ontario and First Nations leadership throughout the pandemic period to ensure that plans were in place and that they received advice, antivirals and most importantly vaccines in a timely manner. Ontario was one of the first provinces in Canada to develop a collaborative influenza pandemic plan with First Nations and Health Canada that was specifically dedicated to First Nations people.[18] It is a plan that stood us in very good stead during the pandemic.

Schools

Schools stayed open. There was a tremendous effort made by the Ministries of Health and Education, as well as school boards and individual schools, to keep the system working smoothly. Kids were vaccinated. Kids who got sick stayed home. School boards, teachers and public health worked together to keep schools open. I consider that to have been a big success.

What Went Wrong

The picture, presented repeatedly by the media, of people lining up for hours to get themselves and their children immunized was a disturbing one. It hinted at possible widespread panic, and a system not able to cope. Neither of those things, as it turned out, was true, but there is no question that the H1N1 immunization process could have been better handled. It boiled down to problems of supply and capacity.

Vaccine Supply

The supply of vaccine was in many ways out of our hands. More than enough was ordered, but we were hardly the only jurisdiction doing the ordering. GlaxoSmithKline was in a race against the clock to produce enough vaccine to fill all its orders but, at least in the beginning, it was a race the company couldn't win. There was simply a mismatch between supply and demand.

In Canada, the start date for the immunization campaign was October 26th. In Ontario, around that time, there were highly publicized deaths related to H1N1 which heightened public concern. The resulting demand for the vaccine temporarily overwhelmed our ability to deliver it. In some parts of the province, lineups were very long and, after one week, our first installment of vaccine was gone.

Supply problems were to continue until well into November. Between production demands on GSK and Health Canada's legitimate need to approve all shipments from a safety perspective, we were not receiving as much vaccine as we needed fast enough.

There were other challenges as well. The World Health Organization had asked that countries and manufacturers use "dose-sparing" methods that would stretch the supply of vaccine as much as possible. Canada chose to use an "adjuvanted" vaccine. An adjuvant is a substance that improves the body's immune response so that less of the vaccine is needed. Because we had never used an adjuvanted flu vaccine in Canada before, there were concerns about safety that needed to be addressed. Adding to the confusion, and ultimately the delays, was the fact that in July 2009 an expert advisory group of the World Health Organization advised that an unadjuvanted vaccine was the preferred option for pregnant women.[19] One of our priority groups was, of course, pregnant women and we determined we needed a supply of unadjuvanted vaccine as quickly as possible. That order was placed with GSK, which further delayed orders of the adjuvanted H1N1 vaccine we needed for the rest of the population. Finally, the vaccine was being shipped in large 500-dose boxes, which caused major storage and administration difficulties.

Capacity

The bigger concern, from my point of view, was our capacity to deliver the vaccine, and I include basic planning in this. Supply was in the hands of the federal government and a manufacturer working under an extremely tight timeline. The truth is, during a pandemic, that likely will always be the case – at least for the foreseeable future. I am quite determined, however, that the problems we experienced with capacity will not.

Simply put, perhaps because we have had 10 years' experience in this province delivering a universal seasonal flu immunization program, we believed that we would be able to easily deliver a pandemic vaccine. As it turns out, that was a little like assuming that because you take a brisk walk every morning, you could compete in the Olympic 100 yard dash.

This was the largest and most rapidly executed immunization program in Ontario's history. We underestimated the logistics of organizing and delivering a mass campaign in extraordinarily tight time frames, across a vast province, in the glare of intense media coverage and in the face of rising demand. We underestimated lineups and demand surges. We had different plans unfolding in different communities, with the result being a different level of service depending on where you were in the province. We didn't fully leverage the primary care physicians who traditionally deliver the seasonal shot. And in too many critical ways, we didn't have the details we needed about how the immunization program was unfolding.

That last point is critical. In an era where there is much talk about electronic health systems and patient records, we do not have in this province the capacity to electronically manage and track our immunization programs.

I did not know during the rollout of the campaign exactly who or how many were getting immunized. For example, to this day I do not know if all the infants, children, health care workers and other vulnerable populations who were in our priority groups received their vaccines. That is a systemic challenge I will work to see addressed before we face this situation again.

We also were affected, and not always in a positive way, by decisions made elsewhere that had a huge impact on us. For example, the contract between the federal government and GSK required a minimum order to be placed, which resulted in Ontario receiving more than it required. The scientific information to support the use of the products was not available until we actually received the product, meaning that the required professional and public education process needed to occur over a matter of days. The vaccine was received in large boxes of 500 doses which was much too big for most small health care providers and physicians to receive, leading to delays while they were re-packaged. And we couldn't start re-packaging until Health Canada had approved us to do so which subsequently led to a complex and time consuming process to ensure safety and quality assurance. The day to day uncertainties related to our vaccine supply were another example, as were recommendations related to the choice of flu vaccine to be used in pregnant women. I would put it this way, with an eye to improving things for next time: the level of collaboration was unprecedented, but the coordination and communication that characterized our national response needs work.

Health System Challenges

I would offer a similar comment on the provincial health system response in Ontario. Although the entire health care system rose to the challenge during the response and the level of collaboration was unprecedented, local health system integration and coordination was not what it should have been. The best example of this might be Local Health Integration Networks (LHINs) which were created four years ago to plan, fund and integrate health services at the local level. Many LHINs found a role for themselves during the response, but it was a role they had to seek out, not one they were mandated to perform. LHINs actually have no defined role during a health emergency, a difficult position to be in for an organization created to plan and integrate health services.

Additionally, Ontario's public health units rose to the challenge by reorganizing their seasonal flu immunization programs to accommodate the H1N1 immunization program, and advancing the start dates of their clinics when the vaccine became available earlier than expected. However, this and many other aspects of the response were only possible because of goodwill – not through any enforceable means. As Chief Medical Officer of Health, I have the authority to issue directives to specific health care providers or health care entities such as hospitals and laboratories where there exists, or may exist, an immediate risk to people's health. What I do not have is the ability to issue directives to boards of health to ensure coordination and standardization of public health programs and services, such as immunization. This power would have been useful during H1N1 and may well be critical in the future.

My conclusion to this report takes the form of one general assessment, one caution and several recommendations.

The general assessment is that, just as I told Ontarians in the fall, we were indeed ready. The proof is in the pudding. We had a plan. It was executed and, glitches notwithstanding, it worked. The numbers show Ontario is among the jurisdictions in the world that best handled the H1N1 pandemic.

The caution is this: Had the pandemic been of a significantly more severe nature, we might not have been as ready. Our acute care system managed, but had many more people swarmed our emergency rooms for much longer, that might very well have tipped the system. In addition, had there been many more deaths early on, the demand for health care services might have overwhelmed an already taxed delivery system.

The recommendations, then, are these:

We need to take a hard look at our immunization system. Are we doing things as well as we can? Can we improve our delivery system? In Ontario, we use physicians and public health units to deliver vaccines. Other provinces use different models. I'm not suggesting one system is better than the other. I'm saying we should look at all delivery options, assess them and adopt the ones that will best serve our needs, with an eye to the next pandemic. In addition, as I noted earlier on, we do not have the capacity to track and manage an immunization program. I am absolutely suggesting that on this, we can do better. The technology exists today. It is a pan-Canadian solution called Panorama that has been in development since after SARS. There have been numerous delays to ensure the system can be adapted to the needs of all provinces and territories. The time is right to move forward. There must be no more delays. Panorama will allow us to track who is getting immunized and when. It will help us with surveillance so we can be ready to respond to outbreaks of disease. It will improve administration, workflow and overall efficiency. It will give us a 21st century tool for dealing with pandemics in the 21st century.

We also need to extend our chain of command to the local level. The system as it is presently constructed does many things well in what I will refer to as "peace time." In "war time," however, when people are getting sick and people are getting scared, the health system needs to accommodate the kind of strong central oversight and management that currently doesn't exist. The Chief Medical Officer of Health must have the authority to direct public health units in real time as he or she sees fit. That authority didn't exist during this pandemic. I or my successor needs to have it the next time around.

There is going to be another influenza pandemic or emerging infectious disease to be dealt with, and there will be another after that. At some point, there will be one that exceeds in severity the one we have just gone through. We have an opportunity now to use the lessons we have just learned to build on the spirit of collaboration that currently exists to make the changes that are necessary so that we will continue to be ready, no matter how grave the threat.

To that end, I urge us to view our health care system through the lens of health emergencies. When viewed through that lens, I believe the picture is not clear. The system is complex. There are 14 Local Health Integration Networks (LHINs) in Ontario. There are 36 separate Public Health Units, all with their own Medical Officer of Health. There are approximately 11,000 primary care physicians in Ontario, most of whom are not linked with LHINs or public health units, but who were involved in the care of the sick, as well as the delivery of the H1N1 immunization programs. The ingredients for a first class system are there, but they need to be better integrated and coordinated to make it function more as a system in a pandemic or any other health emergency, when what is needed more than anything else is just that: a system.

In closing, let me make it clear that these are recommendations not to fix something that didn't work but to improve something that did in order to ensure that it always will. I want to reiterate what I said at the outset. I am proud of the way this province responded to the pandemic. I am proud, in fact, of the way the whole country responded. We were ready. And we will continue to be.

1. Chan M. Experts begin their assessment of the response to the H1N1 influenza pandemic. Opening remarks at the first meeting of the Review Committee of the International Health Regulations; 2010 Apr 12; Geneva, Switzerland. Geneva: World Health Organization; 2010 [cited 2010 May 5]. Available from: http://www.who.int/dg/speeches/2010/ihr_20100412/en/index.html.

2. World Health Organization. Pandemic (H1N1) 2009 update 95: weekly update. Geneva; World Health Organization; 2010 Apr 09 [cited 2010 May 5]. Available from: http://www.who.int/csr/don/2010_04_09/en/index.html.

3. Government of Ontario, Ministry of Health and Long-Term Care, Public Health Division. Ontario influenza bulletin 2009-2010 season: Surveillance week 4 (Jan 24, 2010– Jan 30, 2010). Toronto: Queen's Printer for Ontario; 2010 [cited 2010 May 5]. Available from: http://www.health.gov.on.ca/english/providers/program/pubhealth/flu/flu_09/bulletins/flu_bul_01_20100205.pdf.

4. Government of Ontario, Ministry of Health and Long-Term Care, Public Health Division. Ontario influenza bulletin 2009-2010 season: Surveillance week 4 (Jan 24, 2010– Jan 30, 2010). Toronto: Queen's Printer for Ontario; 2010 [cited 2010 May 5]. Deaths among pandemic (H1N1) 2009 virus cases, April 13, 2009 – Feb 03, 2010, p. 8. Available from: http://www.health.gov.on.ca/english/providers/program/pubhealth/flu/flu_09/bulletins/flu_bul_01_20100205.pdf.

5. Government of Ontario, Ministry of Health and Long-Term Care, Public Health Division, Public Health Surveillance Unit. International influenza surveillance update #33 [internal]. Toronto: Queen's Printer for Ontario; 2010 Jan 29.

6. Public Health Agency of Canada. Deaths associated with H1N1 flu virus in Canada. Ottawa: Government of Canada; 2010 [cited 2010 May 5]. Table: Cumulative number of deaths due to Pandemic (H1N1) 2009, by province/territory, Canada, as of January 28, 2010, 11h00 EST. Available from http://www.phac-aspc.gc.ca/alert-alerte/h1n1/surveillance-archive/20100128-eng.php.

7. Centers for Disease Control and Prevention. CDC estimates of 2009 H1N1 influenza cases, hospitalizations and deaths in the United States, April 2009 – March 13, 2010. Atlanta: Centers for Disease Control and Prevention; 2010 [cited 2010 May 5]. Available from: http://www.cdc.gov/h1n1flu/estimates_2009_h1n1.htm.

8. Khan K, Arino J, Hu W, Raposo P, Sears J, Calderon F, Heidebrecht C, Macdonald M, Liauw J, Chan A, Gardam M. Spread of a novel influenza A (H1N1) virus via global airline transportation. N Engl J Med. 2009 Jul 9;361(2):212-4.

9. Government of Ontario, Ministry of Health and Long-Term Care. Ontario health plan for an influenza pandemic. Toronto: Queen's Printer for Ontario; 2008 [cited 2010 May 5]. Available from: http://www.health.gov.on.ca/english/providers/program/emu/pan_flu/ohpip2/plan_full.pdf.

10. Government of Ontario, Ministry of Health and Long-Term Care, Public Health Division. Ontario influenza bulletin 2009-2010 season: Surveillance week 10 (March 7, 2010– March 13, 2010). Toronto: Queen's Printer for Ontario; 2010 [cited 2010 May 5]. Table 2: Laboratory confirmed cases of pandemic (H1N1) 2009 virus by health unit & health region, reported during Week 10, 2009-10, wave two, wave one, and cumulative confirmed cases between April 12, 2009 – March 13, 2010. Available from:
http://www.health.gov.on.ca/english/providers/program/pubhealth/flu/flu_09/bulletins/flu_bul_01_20100307.pdf.

11. Public Health Agency of Canada. FluWatch April 18 to April 24, 2010 (Week 16). Ottawa: Public Health Agency of Canada; 2010 Apr 30 [cited 2010 May 5]. Table 1: Weekly and cumulative numbers of hospitalized cases, ICU admissions and deaths among pandemic H1N1 2009 confirmed cases, Canada, April 12, 2009 to April 24, 2010. Available from:
http://www.phac-aspc.gc.ca/fluwatch/09-10/w16_10/pdf/fw2010-16-eng.pdf.

12. Walker D; Expert Panel on SARS and Infectious Disease Control. For the public's health: a plan of action. Final report of the Ontario Expert Panel on SARS and Infectious Disease Control. Toronto: Queen's Printer for Ontario; 2004 [cited 2010 May 5]. Available from:
http://www.health.gov.on.ca/english/public/pub/ministry_reports/walker04/walker04_mn.html.

13. Naylor D; National Advisory Committee on SARS and Public Health. Learning from SARS: the renewal of public health in Canada. Ottawa: Health Canada; 2003 [cited 2010 May 5]. Available from:
http://www.phac-aspc.gc.ca/publicat/sars-sras/pdf/sars-e.pdf.

14. Campbell A; SARS Commission. Spring of fear: final report. Toronto, ON: Queen's Printer for Ontario; 2006 [cited 2010 May 5]. Available from:
http://www.health.gov.on.ca/english/public/pub/ministry_reports/campbell06/online_rep/index.html.

15. Public Health Agency of Canada. The Canadian pandemic influenza plan for the health sector. Ottawa: Her Majesty the Queen in Right of Canada; 2006 [cited 2010 May 5]. Annex E: Planning recommendations for the use of anti-influenza (antiviral) drugs in Canada during a pandemic. Available from:
http://www.phac-aspc.gc.ca/cpip-pclcpi/pdf-e/annex_e-eng.pdf.

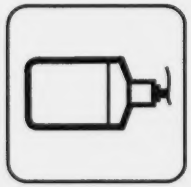
16. Health Canada. Health Canada approves pandemic H1N1 flu vaccine for Canadians [news release]. Ottawa: Health Canada; 2009 Oct 21 [cited 2010 May 5]. Available from:
http://www.hc-sc.gc.ca/ahc-asc/media/nr-cp/_2009/2009_171-eng.php.

17. Public Health Agency of Canada. Guidance document on the use of Pandemic Influenza A (H1N1) 2009 inactivated monovalent vaccine. Ottawa; Government of Ontario; 2009 Nov 20 [cited 2010 May 5]. Available from:
http://www.phac-aspc.gc.ca/alert-alerte/h1n1/vacc/pdf/monovacc-guide-eng.pdf.

18. Ontario. Ministry of Health and Long-Term Care. Ontario health plan for an influenza pandemic. Toronto: Queen's Printer for Ontario; 2008 [cited 2010 May 5]. Chapter 20, Guidelines for First Nations communities; p. 20-1–20-8. Available from:
http://www.health.gov.on.ca/english/providers/program/emu/pan_flu/ohpip2/ch_20.pdf.

19. Strategic Advisory Group of Experts on Immunization. Report of the extraordinary meeting on the influenza A (H1N1) 2009 pandemic, 7 July 2009. Weekly Epidemiological Record. 2010 [cited 2010 May 5];84(30):301-304. Available from:
http://www.who.int/wer/2009/wer8430.pdf.

20. Ontario Physician Human Resources Data Centre. 2008 active physicians in Ontario by specialty and LHIN. Hamilton, ON: Ontario Physician Human Resources Data Centre; 2010 [cited 2010 May 11]. Available from:
https://www.ophrdc.org/Public/Report.aspx?owner=pio.



Catalogue No. 014889 ISBN No. 978-1-4435-3225-9 330 June 2010 ©2010 Queen's Printer for Ontario